TimeMapper

extending WMS with time series data in animated, interactive vector maps

EDC Entwicklerforum
Münster, 17 March 2011

ITC – University of Twente,
Faculty of Geo-Information Science and Earth Observation
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real-world phenomena are dynamic
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we need tools to visualise and disseminate them dynamically
our goal:

vector animated maps
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vector animated maps

from spatio-temporal data
to a format suitable for
internet dissemination
our goal:

vector animated maps automatically and directly from spatio-temporal data to a format suitable for internet dissemination
automatically and directly from standardised data sources (SDI nodes)
automatically and directly in a geo-webservice environment (WMS)
Prototype:

moving object data
Prototype:

moving object data

case-study on icebergs

movements in Antarctica
Prototype:
moving object data
case-study on icebergs movements in Antarctica
Prototype based on:

ITC SDI\textsuperscript{light} OSGEO stack
RIMapperWMS
SDI light ....?
SDI
SDI light
ILWIS + GeoServer + MapServer + OpenLayers + Java stack
RIMapperWMS

spatial database back-end (postGIS):
  spatial and attribute data
  Web Mapping Service configuration
RIMapperWMS

spatial database back-end (postGIS):
  spatial and attribute data
  Web Mapping Service configuration

server application (Java):
  responds to WMS compliant requests
  provides output in SVG
visualisation:
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visualisation: Scalable Vector Graphics
SVG:

XML / Open Web
SVG: XML / Open Web Open Standard (W3C)
SVG:

XML / Open Web
Open Standard (W3C)
supported by all major browsers now (IE9!)
SVG:

standard includes SMIL
declarative animation

(Opera +, Webkit/FireFox ±)
workflow:

Storing temporal data
Designing SMIL animations
Converting temporal component
Developing animated mapping GUI
workflow:

Storing temporal data

<table>
<thead>
<tr>
<th>ID</th>
<th>TIME_ISO</th>
<th>TIME_SECs1970</th>
<th>GEOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>A35B</td>
<td>2009-01-08</td>
<td>3440534400</td>
<td>POINT(-56,-34.2)</td>
</tr>
<tr>
<td>A35B</td>
<td>2009-01-15</td>
<td>3441139200</td>
<td>POINT(-55,-32.3)</td>
</tr>
<tr>
<td>A35B</td>
<td>2009-01-17</td>
<td>3441312000</td>
<td>POINT(-53.7,-35)</td>
</tr>
<tr>
<td>A35B</td>
<td>2009-02-11</td>
<td>3443472000</td>
<td>POINT(-51.7,-31.6)</td>
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<td>A36</td>
<td>2008-12-07</td>
<td>3438892800</td>
<td>POINT(-70.4,-62.3)</td>
</tr>
<tr>
<td>A36</td>
<td>2008-12-20</td>
<td>3437769600</td>
<td>POINT(-73.7,-61.4)</td>
</tr>
</tbody>
</table>
ISO 8601 extended format:

**Schema:** ccyy-mm-ddThh:mm:ss.sssZ

**Example:** 2009-01-28T13:53:41.007Z

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workflow:

Designing SMIL animations
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```xml
<circle id="IB_A35B" r="25">
  <animate id="XanimIB_A35B_0"
    attributeName="cx"
    from="56.4" to="51.3"
    begin="2.56s"
    dur="1.41s"
    calcMode="discrete"
    repeatCount="none"
    fill="freeze" />

  <animate id="YanimIB_A35B_0"
    attributeName="cy"
    from="-76.6" to="-84.2"
    begin="2.56s"
    dur="1.41s"
    calcMode="discrete"
    repeatCount="none"
    fill="freeze" />
</circle>
```
workflow:

Designing SMIL animation movement

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    repeatCount="none"
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```
workflow:

Designing SMIL animation

timing

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workflow:

Converting temporal component
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Converting temporal component


OGC  SMIL

begin="2.56s"
dur="1.41s"
• ISO 8601 to seconds since epoch

Real-world multi-unit time stamps in ISO 8601 format

1. Convert using algorithm

Real-world time stamps in seconds since 01/01/1900

2. Subtract start-time

Still real-world time extent and stamps in seconds but with start-time = 0

3. Multiply by temporal scale

Display-time time stamps in seconds with start-time = 0

T scale = 2.55\times10^{-6}

(T-extent of 136 days in a 30 seconds animation)
• ISO 8601 to seconds since epoch

• subtract start-time

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workflow:

Developing animated mapping GUI
Animated mapping GUI

Temporal legends
• Cyclic
• Digital clock
• Time-bar

Interactive functionalities
• User choices
• Functions to control the temporal dimension
  • Play/Pause
  • Time-slider
  • Looping
  • Speed-slider
Demo time!
Acknowledgments:

Thimothée Becker
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Dita Anggraeni
Erik Dahlström
Helder Magalhaes
David Dailey
Frank Bruder
Questions?

http://geoserver.itc.nl/TimeMapper/
http://kartoweb.itc.nl/RIMapper/

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